ERIC Document Resume	See Instruction Sheet	DATE OF RESUME 6/23/65	DATE RECEIVED

A. PUBLICATION DATA

1. ERIC NUMBER	2. ORIGINATOR CONTROL NO(S).	3. IDENTIFICATION NO.	DO NOT WRITE IN SPACE BELOW
ED000119	7457	N.A.	

4. AUTHOR(S): Torrance, E. Paul

5. TITLE OF DOCUMENT ABSTRACTED: The Creative Use of Research in the Improvement of Instruction

6. PUBLICATION TITLE: N.A.

7. EDITOR(S): N.A.

8. PLACE OF ORIGIN
ORG. University of Minnesota
ST. Minneapolis, Minn.
CITY, STATE
TELE. EXT.
INST/LOC CODE

9. PUBLISHER OR SOURCE: University of Minnesota

10. VOL.	11. PAGES	12. MO./YR.	13. TOTAL PP.
N.A.	N.A.	60	14

MICROFILM COPY AVAILABLE: YES ☒ NO ☐

COPYRIGHT GRANTED: YES ☐ NO ☒

COPYRIGHT RELEASE FILED: YES ☐ NO ☐

TYPE OF REPORT: PROPOSAL ☐ IN-PROGRESS ☐ FINAL ☒ FOLLOW-UP ☐

OTHER ERIC REFERENCES:

ERIC SATELLITE CODE

B. INDEXING DATA

14. SUBJECT AREA

15. TYPE OF ENDEAVOR: report

16. INDEXING TERMS (8-12)

students	measurement			
research	creativity			
teaching methods	talent			

17. ABSTRACT (MAX. 250 WORDS)

The author summarizes his experiments to stimulate students to do original work and presents implications for improving instruction through research on the measurement, development, and utilization of creative talent.

ERIC No.

18. SOURCE OF ABSTRACT

C. FUNDING DATA

19. SUPPORTING ORGANIZATION	20. DIVISION OR DEPT.	21. CONTRACT NO. / PROJECT NO.
	22. TOTAL COST OF PROJECT	
	23. DURATION OR PROJECT	U.S. Department of Health, Education, and Welfare Office of Education

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education

This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated do not necessarily represent official Office of Education position or policy.

5-18 R

7457 V Reporter 5

THE CREATIVE USE OF RESEARCH IN THE IMPROVEMENT OF INSTRUCTION[1]

E. Paul Torrance
Bureau of Educational Research, University of Minnesota

Since the time I was a school principal back in the early 1940's I have been puzzled and bothered by the fact that the results of research make so little difference in the way teachers behave. It has continued to be one of the "thorns in my flesh." Some years ago, I decided that this was because teachers had so little opportunity in their training to master the skills for executing some of the more recent techniques. I then built my teaching around the theory, research, and practice of what I called basic competencies. In the classroom, my students were provided personal experiences in such techniques as: analysis of group process, sociometric grouping, role playing and sociodrama, case conferences, and the like. Outside class, they were required to carry out individual and small-group projects designed to give them further competency by experimenting in safe situations with some of these techniques or an application of some research finding.

Later, I decided that the reason courses in education and psychology make no more difference than they do in teacher behavior is because students are not taught to use their imaginations in applying research findings to their problems -- the gap between the college classroom and the world of work. At first, the remedy seemed simple. I would have my students think creatively about the theory and research which they studied. I would have them each develop a new idea about personality development and mental hygiene. I would give assignments

---

[1] Paper prepared for presentation to Minneapolis Elementary School Principals, March 1, 1960

and tests which require students to think creatively. I would encourage them to undertake self-initiated learning experiences and I would give them credit for such experiences. This solution, however, proved to be deceptively simple. Such requirements made my adult students, most of them experienced teachers, anxious and fearful. Many admitted that they had never in their entire educational careers turned in a paper that contained their own thoughts. Doing a piece of original work was terrifying. I could find no way to communicate to them the meaning of the term "self-initiated" learning. Not only was this a term not included in their vocabularies, but one which defied definition. When confronted with an important research finding and asked to think of all of the ways they could for using this finding to improve education, they asked me, "What do you mean by 'use'? What can you do other than tell it?"

This was a painful and frustrating experience to me and to my students, at least for a few weeks. Many found it an exciting and rewarding educational experience once they accepted the idea and overcame their resistance. The blockages and inhibitions, however, were too great for some. Immediately, I started trying to learn from their experiences. Then I started trying to invent materials, instructional techniques, and assignments which would facilitate the creative process. Although I have learned much through this approach which might be useful to you in getting your faculty to use research in improving their instruction, I think we need to know something about the process through which their creative thinking abilities have been crippled or shackled. This realization started me on the task of trying to measure

the creative thinking abilities, find out how they wax and wane from kindergarten through graduate school, find out what impedes their development at various stages and what influences contribute to their growth, and find out what role they play in vocational success and in coping with life's stresses.

I shall now summarize briefly some of the results of these efforts thus far which I believe may be useful in improving instruction in your schools. First, I shall deal with some of the experiments used in my own teaching. Then, I shall summarize some of the things we have learned from our studies of creative thinking in the early school years and some of the implications for achieving a creative use of research in the improvement of instruction.

LESSONS FROM THE COLLEGE CLASSROOM

Experiment Number 1: "Preps and Starters"

At first, I thought that some type of "prop or starter" might be useful in stimulating adult students (primarily teachers) to do original work. The question was: "What kind of priming will be most useful?" Thus, I set up an experiment to evaluate the relative effectiveness of three current stand-bys. Members of the first group were taught the basic principles of group brainstorming according to Osborn's methods (1957) and encouraged to use this technique in thinking up and developing new ideas. Members of the second group were instructed in the use of another set of principles suggested by Osborn (1957) to aid individuals in thinking of a greater number and higher quality of ideas. These included such principles as: combining with something else, adding something subtracting something, rearranging

or reorganizing, changing the composition, and the like. Members of the third group were exposed to an original theory of personality development and mental health and asked to use this as a model for generating hypotheses and developing them. Members of the control group were, of course, permitted to stay at home or do anything they liked while the others were being given these props and starters.

To make a long story short, I could find no discernible difference between the four groups at the end of the quarter insofar as the quantity and quality of their original ideas were concerned. At that time, I had not yet developed my Test of Creative Scientific Applications, so I could not use this as a criterion.

Experiment Number 2: Imaginative Listening and Reacting

As a result of my first experiment, I decided to abandon starters and primers for this purpose. It was then that I presented by students at the beginning of the quarter with a plan for imaginative listening and reacting. I explained that usually in their educational experiences they had asked, "What does the author say?" or "What does the instructor say?" In addition, I tried to influence them to ask, "what do I think about what the author o instructor says?" Periodically, they were required to submit to me their reactions. Their reactions could be to the method of securing the information presented, the manner of presentation, or the meaning of what was said for their present and future personal and professional activities. I tried to make them as free as possible to disagree, giving reasons and evidence for disagreeing.

Students were urged to react by applying the author or instructor's remarks to some specific situation, discuss the implications of the content of the material. This method of reading-and-listening-reaction is not reading and listening for note-taking of the usual sort, not for outlining, not for mere repetition. It is reading and listening as stimulus for thought. In this way, the reader or listener does something to the material presented and it in turn does something to the reader or listener. Both are changed. This kind of reading does not, of course, rule out note-taking. In fact, I urged them to carry around with them some kind of "idea trap" -- notebook, cards, or the like -- to trap those important ideas which occur in relation to reading either during or after the process. The "pay-off" idea may come while they are sitting in church, in the bath tub, in bed, or anywhere else. I thought that the important thing was to influence them to start "playing around with ideas," testing them, being stimulated by them, letting one thought lead to another.

At the end of the quarter, the evidence was clear. The quality of their original work was definitely superior to that of students given only props and starters or given no aid in thinking up ideas.

Experiment No. 3: Alone or in Groups

Some students kept suggesting that I arrange them in groups and permit them to work in small groups to develop their original ideas. Since various kinds of group methods are being used with apparent success in business and industry, I decided to carry out a simple experiment pitting group ideas against individual ideas. This time, believing that some people prefer to work alone and perform better

alone and that others prefer to work in a group, students were given their preference of working alone or in a group. About 30 per cent preferred to work alone and the others were formed into three-person groups. About one third of these, however, were unable to function as groups and come through with a group product and were permitted to work alone.

The results of this experiment are quite interesting (Torrance, 1958). We could find no difference in the quality of the original work of the groups when compared with that of individuals. There were, however, a number of other important differences. Those who worked in groups learned more as measured by objective pre- and post-tests of achievement of the usual type and as measured by our Tests of Creative Scientific Applications. Furthermore, the phenomenon of regression operated in the group working alone, as usual, but was reversed among those who worked in groups. What happened was that these groups were meeting over coffee, for lunch or dinner, at night and at other times discussing their readings, the lectures, and the issues introduced in the class sessions.

Experiment No. 4: Working Out Ideas

By now, I was disturbed by the fact that much of the original work submitted by students displayed an inability to work out the implementation, testing, and implications of ideas. I wanted to see what could be done about this, so I required students to turn in five original ideas, each to be an improvement of the other. Papers were returned promptly by the instructor with comments concerning their defects and suggesting other avenues for exploration. Students could overhaul and polish up the first idea or they could think up a completely new idea.

By comparison with other classes, members of this class consistently turned in ideas superior to those submitted by other classes and showed more growth in their ability to think up new ideas as measured by the Creative Scientific Applications Test.

Experiment No. 5: Critical vs. Creative Reading of Research

By now, I had discovered that one of the reasons why teachers don't use research in education and psychology to improve their instruction is that they don't read such research. I began to wonder, however, how I should instruct them to go about reading research reports. What kind of evaluative sets would be most productive? This led to the setting up of an experimental design in which a random half of students were asked to read five research articles critically, pointing out defects in the statement of the problem, the questions asked, the hypotheses formulated, the data collected, the analysis of the data, and the interpretation of the results. The other half were asked to read their research articles imaginatively rather than critically. They were asked to think of new possibilities suggested by the problem, other possible hypotheses, improvements which might have been made in collecting and analyzing the data, other possible conclusions and interpretations in the findings, and an appraisal of the possibilities stemming from the findings.

The quality of the original ideas was judged according to an adaptation of the criteria used by the U.S. Patent Office for judging "inventivlevel" (McPherson, 1956). The ideas of students reading research articles creatively were of significantly higher quality than those of students reading the articles critically (Torrance, 1959b).

Thus, bit by bit, we are discovering ways of helping teachers improve their ability to think up ideas for improving the educational enterprise. Perhaps these findings have stimulated in you some ideas for helping your faculty to improve their instruction through research. I would include in this not only the creative application of research findings but the development, testing, and evaluation of new ideas by individual teachers and faculties.

LESSONS FROM THE EARLY SCHOOL YEARS

When we began our exploratory studies of creative thinking from kindergarten through graduate school, we expected that we would find creativity important in mental health and personality adjustment, in vocational success, in the application of knowledge, and in invention and scientific discovery. We had not expected to find the creative thinking abilities useful in acquiring knowledge and basic educational skills, as now measured. I think the evidence is now clear that children can be taught in such a way that their creative thinking abilities are useful in such pursuits, that we need to revise our traditional concepts of under- and over-achievement, that highly creative children learn in quite different ways from children with high IQ's but not high in creativity, and that there are social pressures which interfere with the development of these abilities (Torrance and Staff, 1960).

Let me illustrate this from one of our studies in which we differentiated highly creative children from the highly intelligent ones (Torrance, 1959a). Members of the highly creative group ranked in the upper 20 per cent of their classes on our creativity measures but

not in the upper 20 per cent of IQ. Members of the highly intelligent group ranked in the upper 20 per cent on measures of IQ but not on creativity. Regardless of the measure of IQ used (individually or group administered) about 70 per cent of the top 20 per cent on creativity would have been excluded from gifted groups selected on the basis of IQ alone.

Although there was an average difference of about 26 IQ points between these two groups, there were no significant differences in any of the achievement measures used (Gates Reading and Iowa Tests of Basic Skills). The highly creative children, however, are considered by their teachers as more desirable as pupils, less well known, more ambitious, and more hardworking or studious. In other words, the highly creative child appears to learn as much as the highly intelligent child without appearing to work as hard. My guess is that those highly creative children are learning when they appear to be "playing around," possibly with manipulative and/or exploratory activities which are forbidden.

I might also add that a similar study conducted at the University of Chicago at the high school level (Jackson and Getzels, 1958) yielded almost identical results.

From a developmental standpoint, we know (Torrance, and Staff, 1960) that most of the creative thinking abilities develop rather rapidly from the first through the third grade with boys tending to excel girls. Between the third and fourth graden there is a sharp decrement with boys falling below girls, followed by gains in the fifth and sixth grades. There are of course rare exceptions, as in the

case of the ability to formulate hypotheses about cause which develops slowly but steadily, actually showing a marked gain between the third and fourth grades.

We have found (Torrance and Staff, 1960) that the quantity and quality of ideas produced by children can be improved by teaching them a few principles for thinking of ideas (that is, by giving them some primers), by giving them a "warm-up" session, by competition, and by certain modifications in the instructions given in assigning tasks. We are now trying to find out whether or not these techniques can be taught to teachers in service in such a way as to produce measureable results in the thinking of their pupils. Some of the most obvious blockages seem to be: premature attempts to eliminate fantasy, restrictions on manipulativeness and curiosity, overemphasis or misplaced emphasis on sex roles, overemphasis on prevention, fear and timidity, misplaced emphasis on certain verbal skills, emphasis on criticism of the ideas of others, and coercive pressures from peers.

IMPLICATIONS FOR IMPROVING INSTRUCTION

On various occasions during the past six months I have had the privilege of speaking to a variety of kinds of educational groups about what I consider the implications of the accumulated research concerning the measurement, development, and utilization of creative talent. These have included general groups of classroom teachers, English teachers, reading teachers, language arts teachers, counselors, school social workers, school administrators, teachers and administrators in colleges of teacher education, parents, and school planners. In talking with each, I have tried to apply my own imagination in spelling out some of

the things which need to be done to improve instruction. You have in your hands two pieces of literature which we have prepared for elementary teachers. One is a manual entitled Rewarding Creative Thinking, prepared by four Minneapolis elementary school teachers, one of my research assistants, and myself. The other is a collection of ideas for developing the various creative thinking abilities through the language arts. Through field experiments now underway, we are testing the value of these materials. We are trying to find out whether or not experienced teachers can through in-service training and through the use of such materials as these modify their teaching in such a way as to do a better job of developing the creative thinking abilities.

Time does not permit an enumeration of the suggestions I have been making to the various groups I mentioned. I would like to mention some of the things I have been telling school administrators.

In order to bring about some of the changes which seem indicated, administrators will need to make decisions about the introduction of tests to identify creative talent and to guide the development of the creative thinking abilities. They will have to provide leadership in curriculum development in order to give parallel treatment to the development of the creative thinking abilities along with the cognitive, memory, convergent, and evaluative abilities. Administrators will also need to lead in the development and use of achievement tests which require creative thinking and aid in rewarding appropriately achievement in this area.

Especially will administrators need to give attention to problems of selecting, supervising, and rewarding creative teachers. One recent study, for example, showed that principals' ratings of science

teachers are negatively and significantly related to their scores of tests of creativity and to how much they know about the subjects which they are teaching. Just as creative children present difficult problems to classroom teachers, creative teachers present difficult problems to administrators. Experience in industry, however, indicates that they need not be problems.

Perhaps an additional word needs to be said about the need for selecting, developing, and rewarding creative, adventurous-spirited teachers. The highly creative child tends to feel estranged from his teachers and classmates. This can be expected, unless he has adventurous-spirited teachers who are willing to listen to some of his unusual ideas, help him to test and develop these ideas, and enjoy with him the development of his creative faculties. The creative, adventurous-spirited teacher will impart that spirit to his pupils and even the least imaginative child will probably dare to become more creative. It is reasonable to expect that the teacher who is eager to explore the mysteries of the world about him will fill his pupils with the same desire to discover the new and explore the unknown.

Creative teachers need creative handling. For example, if you cannot tolerate the "independent spirit," you will find it difficult to supervise the work of a creative teacher. Have you ever tried to suggest a change in the work of a creative person just when he is finishing a job? The usual explosion is easily explained. The work at that point is as much a part of him as his vital organs. The best approach is to wait for awhile. Later, you will find him more willing to make alterations.

SUMMARY AND CONCLUSIONS

If you as principals ever accomplish very much toward improving education through research it will be through the creativity of your teachers. In a way, the methods, strategies, teacher-pupil relationships, and the like of each teacher are a unique creation of that teacher. The trouble is that much of the teacher's behavior in the classroom stems from his early, overlearned behaviors -- learned from their parents' or their own teachers. The teacher who departs from this beaten track must engage in creative thought. Thus, if the results of research done by someone else is to be of use, teachers must be stimulated to read this research and then to leap the barrier from learning to thinking and action -- testing it out. If they are to engage in original research, they must be stimulated to become aware of problems, to ask important questions about the gaps in knowledge, to conceive of new ideas for answering these questions, and test some of them out in their own classrooms. Your job is not an easy one but you are in a strategic position to accomplish something along this line. I hope that some of my experiences in trying to stimulate my own students, largely teachers, to think and in trying to understand the creative thinking of children in the early school years will provide you with some clues.

REFERENCES

Getzels, J.W. & Jackson, P.W. The meaning of "giftedness" -- An examination of an expanding concept. Phi Delta Kappan, 1958, 40, 75-77.

Osborn, A.F. Applied imagination (3rd Ed.) New York: Scribners, 1957.

Torrance, E.P., Baker, F.B.; DeYoung, K.N.; Ghei, S.N. & Kincannon, J. Explorations in creative thinking in mental hygiene: I. Alone or in groups? Minneapolis: Bureau of Educational Research, Univer. of Minn., 1958.

Torrance, E.P. Explorations in creative thinking in the early school years. VI. Highly intelligent and highly creative children in a laboratory school. Minneapolis: Bureau of Educational Research, Univer. of Minn., 1959. (a)

Torrance, E.P. Explorations in creative thinking in mental hygiene: III. Effects of induced evaluative sets on the development of new ideas. Minneapolis: Bureau of Educational Research, Univer. of Minn., 1959. (b)

Torrance, E.P.; Bowers, J.E.; Radig, H.J.; Palamutlu, Necla; and Krishnaiah, P.R. The Minnesota studies of creative thinking in the early school years. Minneapolis: Bureau of Educational Research, Univer. of Minn., 1960.